In his paper entitled "A Search for the Fatherland of the Polynesians," Mr. A. K. Newman endeavoured to prove, partly by the evidence of place names, that the first home of the Polynesians was in the Ganges Valley.

Two papers of general ethnological interest were contributed by Miss Fletcher and Mr. E. S. Hartland. In the former—a sidelight on exogamy the author directed attention to the exogamic character of the Omaha social organisation, while in the latter Mr. Hartland discussed the origin of mourning dress, and held that mourning was worn not so much as a disguise, as suggested by Dr. Frazer, but as a means of typifying the union of the dead and as an expression of sorrow and abasement, so as to deprecate the malice of a spirit, naturally annoyed at finding itself disembodied.

It is particularly gratifying to record that the committee appointed at Winnipeg to consider the feasibility of starting an ethnographic survey of Canada reported that, owing to representations made by the council of the Association and by a deputation of the committee and others, which waited upon Sir Wilfrid Laurier, the Dominion Government has included in its estimates the sum of 420*l.* to establish a department of ethnology under the Geological Survey. This most gratifying result may be considered as entirely due to the initiative taken by the Association at the Winnipeg meeting.

Two ethnological papers of great interest were those by Prof. Elliott Smith on the people of Egypt, and by Prof. H. J. Fleure and Mr. T. C. James on the people of Cardiganshire. The latter of these should perhaps be classified under physical anthropology, as the survey was largely an anthropometrical one.

Prof. Elliott Smith began by urging the impossibility of reconstructing the history of man in Egypt unless the work is based on the study of physical characters, as apart from mere measurements, of accurately dated human remains from the three great divisions of the Nile Valley—Lower and Upper Egypt and Lower Nubia. Of the origin of the predynastic Egyptians, all that at present could be safely said was that they showed affinities to both the Mediterranean race and to the Arabs. Although just before the end of the predynastic period some slight change in the character of the population can be seen, it is not until the Third Dynasty that the significance of the change can be fully appreciated. At this date it becomes clear that each of the three divisions of Egypt had its own distinctive population: Lower Nubia, a people identical with the predynastic but tinged with negro; Lower Egypt, the descendants of the predynastic peoples, mixed profoundly with white immigrants, who came in by way of the Delta, while Upper Egypt, though not directly affected by either of these alien stocks, was yet indirectly affected by both, through the intermingling of its people with those of the two other districts.

In the time of the Middle Kingdom this white and Nubian influence became more marked in the Thebaid, and thus the gradual gradation of physical characters, from the black of Nubia to the white of the Levantine population in the north, began to set in, a gradation which has persisted to the present day.

Messrs. Fleure and James pointed out in their paper that the basis of the population of Cardiganshire appears to be the Mediterranean type, that is, a type marked by considerable dolichocephaly, dark hair, slight prognathism, and a stature a little below the average. But as the type becomes fairer these marked characteristics disappear, prognathism ceases to exist, and the head becomes shorter. Amongst this population there is also a fair type, in which the heads become still shorter and the stature higher, while the face becomes opisthognathous.

Physical Anthropology.

In purely physical anthropology two papers only were presented, there being still the marked decline in papers of this nature which has been noticeable during the last five years. It is very much to be regretted that the anatomists and other workers in the field of physical anthropology have ceased from presenting the results of their work to the Association, and it is to be hoped that a turn in the opposite direction will soon set in.

Prof. C. J. Patten described a rare form of divided parietal in the cranium of a chimpanzee. Cases of this kind are extremely rare, and the one under consideration appeared to be an example of complete division of both parietals, each by a horizontal suture, running the entire length of the bones and joining the coronal and lambdoid sutures. The case is of further interest owing to the way in which the upper segment of each bone is again subdivided. Correlated with this condition there is a thinning out of the bones of the cranial vault and a reduction in the size and strength of the zygomatic arch and of many of the processes at the base of the skull.

Dr. W. L. H. Duckworth exhibited a microtome, made by the Cambridge Scientific Instrument Company, which provides a means of preparation of anthropological material possessing great interest. Some of the preparations thus made were mounted as lantern-slides and exhibited; for example, in a section of the leg of an adult man, tissues so distinct in consistency as bone, tendons, and muscles could be seen. Other specimens exhibited were sections of the larynx and tongue.

Finally, the report of the committee to conduct archæological and ethnological researches in Crete contained long reports on Cretan anthropology, by Mr. C. H. Hawes, and physical observations, viz., head form and pigmentation, of Cretan school children, by Dr. Duckworth. Both these reports contained a mass of detailed measurements and observations which it is impossible to summarise. One point may, however, be mentioned. Dr. Duckworth is of opinion that the general physique of Cretan children is frequently, if not always, poor, being markedly inferior to that of British children of the same age.

AGRICULTURE AT THE BRITISH ASSOCIATION.

IN drawing up the programme for the Sheffield meeting the organising committee of the Agricultural Subsection adhered to the lines laid down last year. Certain problems of current interest and importance were discussed at joint meetings so far as possible, and attention was directed particularly to those aspects of the problems on which men of pure science could throw much needed light. There were, therefore, very few general papers, and such as were read were regarded rather as preliminary accounts of work that must come on later for discussion.

The chairman's address has already been printed *in extenso* in these columns (September 8). It dealt with fertility, the eternal and fundamental problem in agriculture, and traced the history of the views that have been held since the early experimenters of the seventeenth century began their work. Fertility depends on several factors, any one of which may at a given time become a limiting factor and determine the growth of the plant. The amount of available mineral food, the supply of water, and the supply of nitrates all enter into the problem. All that science can do as yet is to ascertain the existence of these factors one by one, and bring them successively under control; it is not yet possible to disentangle all the interacting forces the resultant of which is represented by the crop.

Dr. Crowther and Mr. Ruston discussed the impurities of the town atmosphere and their effect on vegetation. Rain water falling within the industrial section of Leeds is highly charged with mineral and tarry matter, and also contains a good deal of acid. The rain of the residential districts is much purer, but still not as pure as country rain. Pot experiments, and observations made in gardens, parks, &c., showed that the effect of the impurity was complex; the stomata of the plants were blocked, especially if they happened to be sunk as in the conifers; the soil also suffered. These actions produced marked results on vegetation; in extreme cases the plants were actually killed, and even those surviving were much affected. The case of grass was examined in some detail because of its technical importance. It was found that the impure rain reduced the yield and the protein-content of the herbage but increased its fibre-content. The feeding value was therefore much diminished.

Prof. Berry followed with an account of the ether extract of the oat kernel. It has long been known in a general way that the ether extract is not all fat, although so labelled as a matter of convenience. Prof. Berry has

examined the extract in detail, and the great value of his work is that he is dealing with definite varieties of oats grown under known conditions. It is understood that the research is being continued, and some interesting conclusions may be looked for.

Mr. A. S. Horne gave an account, illustrated by photographs, of a bacterial disease of potatoes. Not long ago it was supposed that plant diseases were caused by fungi, but cases are steadily accumulating where bacteria are the active agents. Several cases have been worked out at Newcastle, and it was felt that on a future occasion more time will have to be devoted to this important branch of study.

The second day was given up to a discussion of two subjects now coming much into prominence. Sugar-beet growing was dealt with by Mr. Sigmund Stein and Mr. G. L. Courthope, M.P. Later in the day nitrogen fixation was discussed by Mr. Golding and Prof. Bottomley. It has always been known that sugar beet could be grown in England, but the industry never had an opportunity of development by reason of the Continental sugar bounties. The Brussels Convention, however, has so altered the position of affairs that a reasonable prospect of success seems assured; already factories are springing up in different parts of the country, and farmers are contracting to supply the necessary beets. For many years Mr. Stein has advocated beet-sugar production, and in his paper he gave a summary of the various experiments he has made to meet the objections that have from time to time been raised. He claimed that the practical difficulties, both in the field and the factory, are now overcome, and the time is ripe for active development. Mr. Courthope dealt with the financial aspects of the question, and gave a number of carefully prepared statistics showing that the new industry has every probability of success. This paper created a very favourable impression, and the speakers that followed agreed that a good case had been made out. There has, as usual, been a good deal of exaggeration about the possible effect of a new rural industry. If sugar beet is grown, some other crop will have to go out; the gain to the country will therefore be the difference between the new and the old, and not, as is commonly stated, the whole amount that the new crop will bring in Still, there is no doubt that a new industry and a new market would have a useful steadying effect on agricultural prices.

Nitrogen fixation was the next subject. Prof. Bottomley brought forward the evidence in favour of his proposition that Azotobacter, in conjunction with Pseudomonas, both obtained from the root tubercles of Cycas, will "fix" more nitrogen than either alone. He further argues that this mixed culture will grow in soils and "fix" nitrogen to form compounds readily transformable into plant food. Some discussion arose as to the interpretation of the results; the quantities involved are small, and the experimental errors known to be considerable. The great difficulty arises, however, in the absence of a satisfactory standard by which one experiment may be compared with another.

Mr. Golding dealt with his subject in a more general way, his researches having been directed to the whole question of nitrogen fixation in the root nodules of leguminous plants. This fixation is brought about by bacteria which invade the root hair as infection threads, pass through a rod-shaped stage, and finally assume the bacteroid (Y) form. Mr. Golding is steadily overcoming the difficulties of working with the organism in artificial media, and is succeeding in making it pass through the changes that it undergoes in the plant. During the period of active nitrogen assimilation an alkaline substance is formed; after a time, if the products are not removed, assimilation stops, the alkali disappears, and the medium becomes acid. Dr. Russell pointed out that this change from alkaline to acid reaction indicated that the organisms were now utilising the nitrogenous base already formed, and therefore setting the acid free, a change known to go on in other cases.

On Monday, September 5, a joint meeting was held with the Zoological Section to discuss the effect of partial sterilisation of soils. Dr. Russell read a paper which he and Dr. Hutchinson had prepared, giving an account of the work they have been doing at Rothamsted during the past three years. There is a notable increase in productiveness when a soil is heated or treated with volatile antiseptics like toluene. This was traced to an increase in bacterial activity, which, in turn, was shown to be the result of removing some factor that had in the original soil limited bacterial activity. By drawing up a systematic plan of experiment it was possible to find what processes would, and what would not, put the injurious factor out of action, and so the authors had arrived at a list of properties the factor possessed. According to their results it appears to be a living organism larger than bacteria, but developing more slowly, killed at or below 50° or by prolonged drought. It might actively destroy bacteria, or, on the other hand, it might form a protoplasmic layer round the soil particles containing organic matter, and thus keep off and starve the bacteria. The zoologists present made some very useful suggestions. Dr. Shipley recommended sewage-farm soils as the best place to start hunting for the organism. Dr. Ashworth suggested that the amœbæ or amœboid organisms of the soil might be the culprits, and considered that methods of investigation like those used by Musgrave and Clegg or by Noc might with advantage be tried. Mr. T. J. Evans, on the other hand, thought that the results indicated a mycetozoan plasmodium, while Mr. J. J. Lister urged that mycetozoa would require vegetable matter, which, however, they would have in the soil.

Mr. K. J. J. Mackenzie followed with an account of the "points" prized by the breeder of high-class stock, and gave the results of measurements he had made to find out how far the "points" really are correlated with the characters they are supposed to indicate. So far as he has gone—he is pursuing the problem further—the correlation is very slight, and it can only be inferred that the breeder arrives at his eminently successful results rather by an intuitive process than by any use of his "points." The question is of great economic importance, because England is, and seems likely to remain, the stud-farm of the world.

A joint meeting with the Geological Section followed, at which soil surveys were discussed. A paper by Mr. Hall and Dr. Russell was read, dealing with the objects and methods of agricultural soil surveys. The ordinary drift map is not sufficient, although it makes an admirable starting point. It is necessary to classify the soils further, to study them in their relation to the local agriculture, and to ascertain the effect of manures, of rainfall, topographical position, &c. Illustrations were given to show that a soil may be sufficiently described from the agricultural point of view when its mechanical analysis, and its positions on the geological, orographical, and rainfall maps are known. Mr. L. F. Newman gave a preliminary account of his survey of the drift soils of Norfolk, which seems to indicate a fairly regular distribution of the various types of soil. Mr. C. T. Gimingham described the "teart" land of Somerset, on which animals "scour" badly. This condition is confined to one formation, the lower lias, and disappears when even the most superficial covering of alluvium occurs. A large acreage is affected. Evidence is adduced that the cause is to be sought in the physical state of the soil; if this is so, it should be capable of remedy. It is much to be hoped that the field trials which Mr. Gimingham has drawn up to test this view will be carried out.

The last day opened with a paper by Mr. Hall on the cost of a day's horse labour on the farm. This fundamental problem of agricultural economics has been but little investigated, and Mr. Hall's estimate of 2*s.* 7*d.* per day must be regarded as the most complete we have at present. Another economic paper followed, by Mr. Turnor, on costs in the Danish system of dairy farming. The data were gathered during a tour of Denmark, and represent a good deal of study of the subject. Mr. Turner is shortly bringing out a book in which the results of his investigations will be more fully dealt with.

The rest of the day was devoted to a discussion jointly with the Economic Section of the errors of agricultural experiments. Prof. Wood opened the subject with three papers prepared in conjunction with Messrs. Stratton and Bruce. From the results it appears that many of the feeding trials carried out in the country are of very doubtful value. Agriculturalists have usually neglected the experimental error; in few, if any, of the numerous county council experiments, for instance, is it ever taken into account. Prof. Wood's papers, along with one by Mr. Hall and Dr. Russell on field trials, have emphasised the import-

ance of the matter, and steps are being taken to distribute these papers among agricultural experimenters.

A paper by Mr. Collins on the errors of milk analysis concluded the session.

The position of agriculture at the British Association is not yet settled. Whatever the council decide to do, it is hoped they will continue to give a separate organisation to agriculture, and thus afford to workers in agricultural science an opportunity—the only opportunity for some of them—of meeting their fellow workers in pure science and discussing their problems. It is necessary to get help from several sides and not simply from one, as from the chemical or the botanical, which seems to be the theory of a subsection. However, whether lawfully or not (it appears to have been unlawfully) the organising committee has hitherto enjoyed the fullest liberty, and has succeeded in arranging a series of meetings that have proved extremely helpful to agricultural investigators, and promise to play no small part in the encouragement of agricultural research.

PHYSIOLOGY AT THE BRITISH ASSOCIATION.

IN addition to the presidential address, which has appeared already in NATURE, there were a number of interesting papers communicated to the section. Physiology was unique in that it was the only section that met at the University; and thus, although somewhat isolated from the other sections, enjoyed the advantage of the laboratories for demonstrations.

There were two joint meetings, one with Chemistry (Section B) and Botany (Section K) on the biochemistry of respiration, and the other with Education (Section L) on speech; the latter will be reviewed in the proceedings of the section of Educational Science. In addition, Dr. Leonard Hill, F.R.S., gave an interesting address on the prevention of caisson disease. The individual papers will be reviewed, as much as possible, so as to form groups in a logical sequence.

The discussion on respiration, held in the meeting-room of Section K, was opened by Dr. F. F. Blackman, F.R.S., who dealt with the subject under three headings.

(1) The series of chemical reaction which take place during oxidation. He took glucose as a typical example, of which the final products are carbon dioxide and water, but the intermediate steps are difficult to follow. Buchner's zymase produces alcohol and carbon dioxide from glucose, but it has been shown that alcohol cannot be oxidised by plants, and hence it must be surmised that some other substance, before the breakdown has reached the alcohol stage, is what is actually oxidised. There are probably many of these fugitive compounds, amongst which may occur lactic acid and di-hydroxy acetone. An alkaline sugar solution, as the result of exposure to sunlight, gives rise to substances which are easily oxidised. He then dealt briefly with oxidases, peroxide formation, and Palladin's hypothesis of respiratory chromogens, which are oxidised by oxidases to peroxides, and then pass on the oxygen to oxidisable material.

(2) The physical chemistry of the processes involved in oxidation. Influence of temperature on velocity of reaction (usually shows a coefficient of about 2·5 within the limits of temperature at which living processes can occur); the uniformity of the respiratory quotient (O_2/CO_2) at different temperatures and the effect of the concentration of the reacting substances were discussed. He illustrated these points by referring to his experiments with green leaves and potatoes (starchy and rich in sugar). The output of carbon dioxide by green leaves is reduced to zero by exposure to sunlight. The potatoes rich in sugar show a greater rate of oxidation than the starchy ones. The conclusion is arrived at that there is a minimal tissue respiration and an excess of respiration depending on the supply of respirable material.

The influence of accelerators, paralysators, and other substances was mentioned.

(3) Special influences of colloidal nature of cell protoplasm. Oxidation and reduction take place side by side, and death of the cell mixes up these two processes. Alterations of permeability of protoplasmic septa may account for changes in physiological oxidation processes.

Dr. H. M. Vernon referred to Dakin's work on oxidation of fatty acids and amino-acids by hydrogen peroxide and traces of ferrous salts. If zymase is allowed to act upon glucose for a short time, then the solution is boiled and oxidase and hydrogen peroxide are added, there is almost complete oxidation to carbon dioxide and water; this suggests that oxidases may act in living cells if organic peroxides can replace hydrogen peroxide. His own experiments on survival respiration (kidney) point to the presence of oxidases, and that certain poisons act by combining with aldehyde or similar groups. Some substances act especially on the "high-grade" process (formation of carbon dioxide) and not so much on the "low-grade" process (oxygen absorption), and thus the respiratory quotient is lowered. In relation to minimal protoplasmic and excess respiration, he directed attention to the fact that minced tissues show at first a greater output of carbon dioxide than when intact, but that the respiration soon falls to a much lower level.

Dr. E. F. Armstrong pointed out that in many respects oxidases differed from the other kinds of enzymes (they are heat stable and not specific in action), that their action can be imitated by colloidal suspensions of inorganic matter, and that traces of inorganic material are usually present in them. There are, however, specific oxidases. He then demonstrated the blackening of laurel leaves by the action of toluol (other chemically inert substances with little affinity for water act similarly), which he ascribed to a general breakdown of the protoplasm with liberation of oxidases.

Mr. D. Thoday spoke about the result of experiments on anæsthetised leaves. Small doses of chloroform cause a temporary increase of oxidation. A large dose causes a diminution in the output of carbon dioxide; with Helianthus and cherry laurel there is a great increase in oxygen intake, which quickly falls off, but with Tropæolum the oxygen intake falls at once. It was suggested that tannins oxidise first, and as there are no tannins in Tropæolum there is no initial increase of oxidation. Probably the result is brought about by an increase of permeability.

Prof. H. E. Armstrong, F.R.S., referred to Leathes' work on the splitting of fats at intermediate points in the carbon chain, and to the formation of peroxides by manganese and iron with hydroxy-acids. Oxidation may take place by decomposing water with liberation of hydrogen; in plants the hydrogen may be used to reduce carbon dioxide to formaldehyde. The leaf surfaces show a permeability similar to that found by Adrian Brown for barley grains.

Prof. Waller and Dr. Reynolds Green spoke, and Dr. Blackman replied.

Dr. Leonard Hill, F.R.S., reviewed the work done in relation to the prevention of compressed air illness. Whilst exposed to high pressure the body dissolves a larger amount of gas than at ordinary atmospheric pressure, and when the pressure is reduced bubbles of gas may be set free in the blood vessels. The solubility of the gas follows Henry's law; owing to the capacity of the tissues to absorb oxygen it is only the nitrogen that is set free in the vessels. The symptoms depend on the portion of the circulation which is stopped by the nitrogen embolus. Different portions of the body saturate at different rates, but work, by increasing the circulation, increases the rapidity with which the body takes up and gives off nitrogen. By analysis of the gases in urine it can be shown that it takes an appreciable time for the body to get into equilibrium with the pressure of the nitrogen in the atmosphere, or, in other words, the blood does not get into equilibrium with the gas on passing once through the lungs.

The relative merits of uniform decompression and decompression by stages were discussed. Long shifts are better than short, as there are fewer decompressions for the same amount of work, and the danger is due to decompression. When symptoms occur they can be abolished, or the danger minimised by recompression to the original pressure.

He recommended that, during decompression, occasional inhalations of oxygen should be taken (to lower the partial pressure of the nitrogen in the lungs, and thus